Appendix E Integrated Technical Planning Details

E.1 Integrated Technical Planning

Planning provides the basis for effective action and the ability to anticipate and prepare for changes that inevitably affect program progress. Planning keeps all the elements of the organization moving in synchronization toward the same goal by establishing baseline expectations of future and current actions. By establishing these baselines, the organization is better equipped to adapt to the inevitable changes facing it.

In the Acquisition Management System (AMS), the Integrated Program Plan (IPP) details the minimum planning required to meet Joint Resources Council (JRC) 2b. The IPP includes both programmatic and system engineering (SE) planning elements. Additional SE planning ensures a more accurate costing of the program. Performance of these planned elements significantly reduces the percentage of requirements found in an Independent Operational Test and Evaluation. This additional SE planning may either be included in the IPP or in a separate SE Management Plan (SEMP).

The National Airspace System (NAS) Modernization System Safety Management Plan (SSMP) governs system safety efforts conducted in the AMS. The SSMP requires each program to develop, as part of the IPP, an Integrated System Safety Program (ISSP) tailored to the program's safety needs.

E.2 Requirements Management Planning

This planning specifies the tasks, products, responsibilities, and schedule for managing requirements throughout product development. The planning begins in the early stages of Investment Analysis and SEMP development and is baselined at the JRC 2b and is updated as necessary at subsequent exit reviews.

The planning section details the total effort in managing requirements. The work includes identifying and capturing requirements (Paragraph 4.3.3.1), analyzing and decomposing requirements (Paragraph 4.3.3.2), and allocating requirements (Paragraph 4.3.3.3).

E.2.1 Inputs to Requirements Management Planning

The following inputs are normally required for the planning section:

- Internal and external requirements as defined in Paragraph 4.3.1
- Component-specific program guidelines
- Program-specific organizational constraints and assumptions to be used in the program
- Program-specific schedule constraints and events
- Top-level conceptual alternatives, functional analyses, design support alternatives, and initial system evaluations
- Technology availability or constraints
  - Captures those technologies for which requirements necessary to meet requirements and the resulting derived requirements from them
  - Constraints identify the envelope of the technology operation

  - Inputs may include identification of key technologies, performance, maturity, cost, and risks, as well as technology breakthroughs and forecasts

- Derived requirements, which are developed through trade studies and are not provided by external sources, such as the stakeholder or government policies
- Outputs from each stage of the program lifecycle
- Concepts of the product (e.g., operational, maintenance, support, logistics)
- New or revised directions and limitations established by the acquisition decision authority
- Records of meetings, conversations, and agreements with stakeholders, and internal functions relating to documented changes

E.2.2 Requirements Management Planning Steps

Following are the steps in producing a planning section, which is normally coordinated and written by an SE group.

E.2.2.1 Step 1: Collect Inputs

All program organizations that develop and manage requirements are responsible for providing planning section inputs to the planning coordinator.

E.2.2.2 Step 2: Prepare Planning Section

The planning coordinator prepares the planning section. Although no standard format exists for developing the section, it is recommended that the section contain the key elements of tasks, deliverables, responsibilities, and schedule. Developing a standard format may be included in this step. The section provides for deviations from the Requirements Management process (Section 4.3).

E.2.2.3 Step 3: Coordinate and Baseline

The planning coordinator provides drafts of the planning section to all stakeholders for review, and the version approved at the JRC 2b becomes the baseline planning section.

E.2.2.4 Step 4: Maintain Planning section

The planning coordinator monitors the program's progress continually throughout the life of the program, and any program changes in the program are reflected in the planning section.

E.2.2.5 Step 5: Provide Current Planning Section

The planning coordinator provides the planning section to all stakeholders (including, at a minimum, the program manager, users, and project leaders) required to manage by the planning section.

E.2.3 Outputs of Requirements Management Planning

The following outputs are normally required for the planning section.

E.2.3.1 Requirements Management Planning Tasks

It is recommended that the tasks to be described in the planning section reflect the processes detailed in Requirements Management (Section 4.3).

The other two subprocesses in the Requirements Management Process—Develop Verification Approach and Analyze Verification Data—are the subjects of the Verification process in Section 4.12.

E.2.3.2 Requirements Management Planning Products

A key function of the planning section is to define the products of the Requirements Management process. Another key function of the planning section is to assign responsibilities to various subprocesses within the Requirements Management process (Section 4.3).

E.2.3.3 Requirements Management Planning Schedule

A function of the planning section is to provide a schedule of the requirements management tasks. See Section 4.3 for a description of the schedule considerations.

E.2.4 Requirements Management Planning Metrics

The primary planning metric is the publication and approval of the planning section at the Investment Analysis, phase one, exit review and the updating at subsequent reviews. A metric of the requirements process is the number of requirements identified after System Design Review (SDR). This metric may also apply to the planning section as well, since it reflects the quality of the program planning.

E.2.5 Requirements Management Planning Tools

A word-processing tool and Dynamic Object-Oriented Requirements System are needed.

A sample outline for a requirements management planning section appears in Table E-1. Also it is recommended that the planning section be developed in accordance with the Requirements Management process described in Section 4.3 and reflect the principles reflected in government and industry standards, such as MIL-STD-961 or -490 for specifications, EIA 632 for the SE process, and ARP 4754 for commercial aircraft development. The outline (Table E-1) depicts the recommended contents of the Requirements Management planning section.

Table E-1. Table of Contents Requirements Management Section of SEMP

Requirements Management Planning Section Example Outline		
1	SCOPE	
1.1	Overview	
1.2	Process Overview	This section contains a diagram showing the interrelationship between the various process elements, including the requirements management tool, if any.
2	APPLICABLE DOCUMENTS	
3	TASKS	The tasks described are tied to the specific organizational

Requirements Management Planning Section Example Outline		
		and program requirements in accordance with Section 4.3.
3.1	Identify and Capture Requirements	
3.2	Analyze and Decompose Requirements	
3.3	Allocate Requirements	
3.4	Derive Requirements	
3.5	Manage Requirements Changes	
4	PRODUCTS	This section describes the various program requirements documents. The section describes what organizational entity is the recipient of the product; for example, the product team, stakeholder, other project teams, company management, or outside organizations, such as manufacturing, product support, test and evaluation, or supplier management.
4.1	Requirements Documents	This section enumerates and describes the various program requirements documents to be produced.
4.2	Requirements Allocation Matrices	This section describes the characteristics of the requirements allocation sheets to be produced on this program.
5	RESPONSIBILITIES	This section details responsibilities of the various organizational entities to accomplish the tasks of Section 3. The responsibilities are to be tied to the tasks of Section 3.
6	SCHEDULE	The schedule shown in this section is to be tied to the milestones of the IPP.
7	AUTOMATED REQUIREMENTS TOOL	This section describes the planned use of the requirements management tool, if any.
8	NOTES	
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E.3 Functional Analysis Planning

The Functional Analysis planning section of the SEMP specifies the tasks, products, responsibilities, and schedule for functional analysis throughout the development of the product. Because there is no program level SEMP in the early phases of the program (i.e., phase 1 of Investment Analysis), Functional Analysis in these phases is guided by the NAS-level SEMP. When the IPP is developed, the Functional Analyses is guided by the program's tailored SEMP. The planning section is baselined at the JRC 2b and is updated as necessary at subsequent

exit reviews. This planning section details the total effort for managing functional analysis. This work includes analysis of the concept of operations and environment, the decomposition of functions into subfunctions, decomposing and allocating requirements to functions, evaluating alternative decompositions, defining functional sequences and timelines, defining functional interfaces, and documenting the functional baseline. The outline (Table E-2) depicts the recommended contents of the FA planning section.

E.3.1.1 Inputs to Functional Analysis Planning

The following inputs are normally required for planning:

- Mission Need Statement (MNS) and final Requirements Document (fRD), which detail the system's expected operational environments
- Component-specific program guidelines
- Program-specific constraints and assumptions, such as nature of the program's project teams
- Program-specific schedule constraints and events
- NAS SEMP, which provides the overall plan for conducting SE as part of NAS modernization

E.3.1.2 Functional Analysis Planning Steps

The planning section is normally coordinated and written by an SE group. Following are the steps in producing this section.

E.3.1.2.1 Step 1: Collect Inputs

All program organizations developing and managing requirements are responsible for providing planning inputs to the planning coordinator.

E.3.1.2.2 Step 2: Prepare Planning Section

The planning coordinator prepares the planning section. No standard format exists for developing the section; however, it is recommended that the section contain the key elements of tasks, deliverables, responsibilities, and schedule. The plan provides for justification and deviations from the Functional Analysis process (Section 4.4).

E.3.1.2.3 Step 3: Coordinate and Baseline

The plan coordinator provides drafts of the plan for review. The version approved at JRC 2a becomes the baseline plan.

E.3.1.2.4 Step 4: Maintain Planning Section

The plan coordinator maintains continuous cognizance of the program progress throughout the life of the program, and changes in the program are reflected in the planning section.

E.3.1.2.5 Step 5: Provide Current Planning Section

The plan coordinator provides the planning section to all parties required to manage this section. At a minimum, these organizations include the program manager, the stakeholders, and project leaders.

E.3.1.3 Outputs of Functional Analysis Planning

The following outputs are normally required for the planning section.

E.3.1.3.1 Functional Analysis Planning Tasks

It is recommended the tasks described in the planning section reflect the processes described in Functional Analysis (Section 4.4). These processes are as follows:

- Define the operational mission, environment, and requirements
- Define top-level functions
- Organize functions into logical relationships
- Decompose functions Into subfunctions
- Define internal and external interfaces
- Evaluate alternative decompositions
- Define sequences and timelines
- Complete functional architecture

E.3.1.3.2 Functional Analysis Planning Products

The products of the functional analysis plan are the (a) functional architecture, (b) Concept of Operations (CONOPS), and (c) Issues and Concerns.

E.3.1.3.2.1 Functional Architecture

The functional architecture primarily is in the form of functional flow diagrams and/or timeline sequences produced in accordance with the directions contained in Section 4.4. The architecture contains a description of the system's functions and their inter-relationships, as well as a description of the functional interfaces and the functional sequences or timelines.

Functional architecture development is conducted in relation to requirements. As requirements are developed in increasing detail, the functional architecture is also developed in like detail. This means that as long as requirements are being developed, so is the functional architecture. Though the functional analysis continues in detail, the functional architecture is baselined at the Internal System Requirements Review or JRC 2b, whichever occurs first. This baseline is a functional description of the proposed system as it is described in the system-level specification.

E.3.1.3.3 Functional Analysis Planning Responsibilities

A key function of the planning is to assign responsibilities to various subprocesses within the Functional Analysis process. In general, one organization (or person) executes the process. In addition, within each process, one organization (or person) is responsible for specific tasks or decisions within that process. The discussion below gives guidance in assigning responsibilities

to the various subprocesses. In the end, these assignments may vary greatly according to the product and the organization.

In general, SE assisted by design, support, program management, and stakeholders, normally performs functional analysis. SE also normally has ownership of the electronic tool with the functional analysis capability.

E.3.1.3.3.1 Responsibility for the Define the Operational Mission, Environment, and Requirements Subprocess

SE normally has overall responsibility for this process; however, the process is to be conducted in close cooperation with the stakeholder.

E.3.1.3.3.2 Responsibility for the Define Top-Level Functions Subprocess

In this process, the operational mission, environment, and existing requirements (including needs) are transformed into the required functions, which are listed.

E.3.1.3.3.3 Responsibility for the Organize Functions Into Logical Relationships Subprocess

The functions listed (see Paragraph 4.3.4.4.1.3.3.2) are organized into logical (input-function-output) and/or sequence relationships.

E.3.1.3.3.4 Responsibility for the Decompose Functions Into Subfunctions Subprocess

This process decomposes functions into subfunctions to a level at which the requirements associated with a specific function may be allocated to specific elements of equipment, software, personnel, procedures, and facilities. The process is normally an SE responsibility with assistance from designers.

E.3.1.3.3.5 Responsibility for the Define Internal and External Interfaces Subprocess

System engineers, assisted by designers, normally conduct this subprocess also. The process shall also include participation of the Interface Working Group (IWG), discussed in Interface Management (Section 4.7).

E.3.1.3.3.6 Responsibility for the Evaluate Alternative Decompositions Subprocess

In this subprocess, the functions are broken down further in increasing detail consistent with the further development of requirements.

E.3.1.3.3.7 Responsibility for the Define Sequences and Timelines Subprocess

SE also normally conducts this subprocess, assisted by design personnel, operations, and the stakeholders.

E.3.1.3.3.8 Responsibility for the Complete Functional Architecture Subprocess

System engineers, who own the electronic tool on which it is produced, publish the functional architecture. The output of this subprocess shall support interaction between the Requirements Management process (Section 4.3) and this Functional Analysis (Section 4.4). Design personnel within each project team are normally responsible for assigning performance

requirements to specific functions and subfunctions. SE records these allocated requirements in the requirements electronic database.

E.3.1.3.4 Functional Analysis Planning Schedule

A planning function is to provide a schedule of the functional analysis tasks. It is recommended that the schedule show the delivery dates of the product, namely, the functional architecture. The schedule, which provides the necessary sequence of events, needs to identify the task start dates and end dates and key them to the events outlined in the IPP template of Figure 4.2-3. Functional analysis is normally accomplished at specific levels in the AMS phases discussed below.

E.3.1.3.4.1 Mission Analysis Through Define Mission Need

It is recommended that, prior to the IA, modes of operation and the top-level functional architecture be established and functional interfaces with other systems identified. The top-level functional architecture is developed during this phase.

E.3.1.3.4.2 Investment Analysis—Alternatives Assessment

It is recommended that, prior to the ISRR, the functional architecture be established to the second level of the system architecture by decomposing the top-level functions. Prior to the SDR, the functional architecture is developed to the lowest level of the functional architecture by further decomposition.

E.3.1.3.4.3 Investment Analysis—Requirements Baseline

Prior to the JRC 2b, the functional architecture is developed to the third (or lower) level of the system architecture by further decomposition of the functions.

E.3.1.3.4.4 Solution Implementation

The contractor or vendor, with government assistance as directed by the contract, is to continue the functional decomposition in support of defining increasingly detailed requirements and specifications.

E.3.1.4 Functional Analysis Planning Metrics

The primary planning metric is the publication and approval of the planning at the JRC 2b phase exit review and the updating at subsequent reviews.

E.3.1.5 Functional Analysis Planning Tools

No templates or standards currently exist for this planning. However, the planning section is developed in accordance with the Functional Analysis process (Section 4.4).

Table E-2. Table of Contents Functional Analysis Planning Section of SEMP

Functional Analysis Planning Section Example Outline		
1	SCOPE	
1.1	Overview	
1.2	Process Overview	This section contains a diagram showing the interrelationship between the various process elements, including tools, if any.
2	APPLICABLE DOCUMENTS	
3	TASKS	The tasks described are tied to the specific organizational and program requirements in accordance with Section 4.4.
4	PRODUCTS	This section describes the various functional analysis outputs in accordance with Paragraph 4.4. The section describes what organizational entity is the recipient of the product; for example, the product team, stakeholder, other project teams, company management, or outside organizations, such as manufacturing, product support, test and evaluation, or supplier management.
5	RESPONSIBILITIES	This section details responsibilities of the various organizational entities to accomplish the tasks of Section 3. The responsibilities are to be tied to the tasks of Section 3.
6	SCHEDULE	The schedule shown in this section is to be tied to the milestones of the IPP.
7	AUTOMATED REQUIREMENTS TOOL	This section describes the planned use of the requirements management tool, if any.
8	NOTES	
	APPENDICES	

E.4 Synthesis Planning — Reserved

E.5 Trade Studies Planning

The Trade Study planning documents the formal management planning regarding how alternative solutions to a problem or design issue associated with a program/project product development is to be assessed in a fair and impartial manner.

Trade study planning:

- Provides the formats for how trade study results and information are to be presented to management at design reviews
- Identifies the organization or person designated to be the trade study leader
- Identifies any tools that are to be used in performing of the trade study (i.e., cost models, computer simulations, test articles and fixtures, analytical tools)

- Provides the criteria (including constraints) under which the trade study is to be conducted
- Provides instructions on where trade study results and data are to be stored for future reference and which organization is responsible for maintaining the data

The outline (Table E-3) depicts the recommended contents of the Trade Study planning section.

E.5.1 Inputs to Trade Study Planning

The following inputs are typically required in preparing the trade study planning section. Other program/project-unique inputs may exist and be considered as appropriate.

- Definition of the problem that is to be studied
- Program/project schedule
- Program/project requirements
- Document preparation tools

E.5.2 Trade Study Planning Steps

E.5.2.1 Step 1: Collect Inputs

Coordinate with the program technical groups to obtain input information, including source data.

E.5.2.2 Step 2: Analyse Inputs

Review and organize input data.

E.5.2.3 Step 3: Define Activities and Effort

Work with the technical experts to document trade study activities.

E.5.2.4 Step 4: Lay Out and Baseline Section

Develop and coordinate the draft planning section, obtain necessary approvals (program management, senior technical experts, etc.), and release the baseline version of the SEMP.

E.5.2.5 Step 5: Interface With Other Processes

Coordinate and interface with other processes throughout planning.

E.5.3 Outputs of Trade Study Planning

The output is a trade study planning section that includes the items described in the following paragraphs.

E.5.3.1 Problem Definition

A clear statement of the problem to be solved by a trade study is required to properly focus the efforts of participants. The problem is usually associated with meeting a specific requirement. The requirement needs to be defined to a level of detail that is appropriate for the project's current product development phase. In addition, it is recommended that any related requirements be listed that may be affected by the trade study. Stakeholder agreement is to be

established on all high-level performance or mission requirements before the trade study is conducted.

E.5.3.2 Evaluation Criteria

A key step in eliminating or minimizing bias in trade studies is to define a consistent set of evaluation criteria before the trade study is started. Technical evaluation criteria are to reflect all technical requirements, and effective evaluation criteria shall:

- Differentiate meaningfully between alternatives without bias
- Relate directly to the purpose of the trade study (i.e., they are requirements-based)
- Be broadly based to ensure coverage of all decision factors
- Be independent of each other as much as possible
- Be universally understood by all trade study participants

E.5.3.3 Alternative Solutions

A broad set of alternative solutions needs to be developed prior to any evaluation is conducted. It is recommended that the affected disciplines conduct brainstorming sessions to develop a large number of alternatives for the trade study and that the trade study leader provide background information to all trade study participants before the brainstorming sessions.

E.5.3.4 Trade Study Tools

It is recommended that tools compatible with the problem under study be selected before the trade study is conducted.

E.5.3.5 Trade Study Schedule

It is recommended that a schedule be developed that identifies personnel responsible and due dates for completing each task associated with the trade study. The schedule is designed to support the overall program/project integrated master schedule.

E.5.4 Trade Study Planning Metrics

The metric for measuring the product of this process is completion of the planning section. Also, the cost to produce and update the section may be measured.

E.5.5 Trade Study Planning Tools

A word-processing tool is needed.

328 **Table E-3. Table of Contents Trade Studies Planning Section of SEMP**

Functional Analysis Planning Section Example Outline		
1	SCOPE	
1.1	Overview	
1.2	Process Overview	This section contains a diagram showing the interrelationship between the various process elements, including tools, if any.
2	APPLICABLE DOCUMENTS	
3	TASKS	The tasks described are tied to the specific organizational and program requirements in accordance with Section 4.6.
4	PRODUCTS	This section describes …
5	RESPONSIBILITIES	This section details responsibilities of the various organizational entities to accomplish the tasks of …
6	SCHEDULE	The schedule shown in this section is to be tied to the milestones of the IPP.
7	AUTOMATED REQUIREMENTS TOOL	This section describes the planned use of tools…
8	NOTES	
	APPENDICES	

329 **E.6 Interface Management Planning**

330 Interface management (IM) planning ensures establishment of the formal management system
331 of interface (I/F) controls that enable physical and functional compatibility between interfacing
332 hardware, software, personnel, and facilities. This planning:

333 • Provides the means for identifying, defining, documenting, and controlling the interfaces
334 at all levels of the system

335 • Provides the means for changing the interfaces as required by the evolution of the
336 design and for resolving interface incompatibilities

337 • Guides management, control, and documentation of all system functional and physical
338 interfaces

339 • Establishes the Interface Working Group (IWG) and its policies and procedures

340 • Contains requirements and templates for preparing, revising, and processing the
341 interface documentation; identifies products

342 • Establishes the participants of the I/F management process and their responsibilities

343 • Establishes the interface management schedule

344 The IWG Chair drafts the IM planning policies and procedures in the early phase of Investment
345 Analysis concurrent with the IPP Schedule. The IWG Chair updates and reviews the IM

planning section of the SEMP to reflect the system functional and physical architectures developed in later phase of Investment Analysis.

E.6.1 Inputs to Interface Management Planning

There are several inputs typically required to prepare the interface management planning section. A description of each input follows along with a short justification and the sources of the input. Other unique program inputs may exist that are relevant to the preparation of the IM planning section. As appropriate, it is recommended that these be included:

- **IPP**
  - Program Management prepares the IPP with input from system engineering. The IPP is required to enable preparation of the I/F management schedule and to ensure coherent, complete, consistent and timely I/F design at all levels of the system.
- **SEMP**
  - SE prepares the SEMP. IM planning is an important adjunct to the SEMP. The IM planning section depends on products defined and scheduled by the SEMP and is therefore partially driven by it.
- **SE Schedule, which is prepared by SE**
  - The IM planning schedule and products are SEMP-driven.
- **System Requirements Documents**
  - SE generally prepares these documents, but they also are prepared occasionally by stakeholders or outside agencies. The documents define the system external interfaces and the (internal) interfaces between the system segments. They are therefore an important point of departure and basis for planning and controlling the system interfaces.
- **System Functional and Physical Architecture**
  - The system architectures are prepared early in the Investment Analysis through comprehensive trade studies of alternative configuration studies. The architectures determine where the system/segment interfaces exist and are the point of departure for the detailed identification and definition of the interfaces. The architectures also are the basis for allocating responsibilities of interfaces.
- **Design Review Plans**
  - These plans are to be used as the bases for conducting reviews and audits of the interfaces. The corporate design review plans specify the required status of development of interfaces at the various prescribed design review milestones.

E.6.2 Interface Management Planning Steps

Following are the major steps required to develop IM planning.

E.6.2.1 Step 1: Appoint IWG Chair

The program management generally appoints the IWG Chair, who is the key person in the I/F definition and control process. This individual is identified early in the program because he/she

is chartered with the responsibility of developing and establishing the policies and process for identifying, defining, documenting, auditing, and controlling interfaces.

E.6.2.2 Step 2: Collect Inputs

Collect the inputs identified in Paragraph E.6.1.1.

E.6.2.3 Step 3: Analyze Inputs

Review, analyze, and organize the inputs collected. The interfaces and constraints embedded in the requirement documents and the system architectures are to be evaluated and assimilated and used as bases for establishing interfaces and responsibilities, as well as to determine if there are program-peculiar interfaces that need special treatment/attention. The planning sections and schedules are to be used as bases for constructing the interface management schedule.

E.6.2.4 Step 4: Define Activities and Effort

Establish the IWG policies and procedures; delineate and coordinate the processes to be applied for identifying, defining, documenting, changing, auditing, and controlling interfaces; identify the responsibilities of participants; and identify standard formats to be used for documenting interfaces and their change process.

E.6.2.5 Step 5: Lay Out and Baseline

Prepare the IM planning section, which captures the processes, formats, schedule, and responsibilities. The processes and formats embedded in the IM planning section of the SEMP shall be consistent with the IPP. Using the IPP and Integrated Program Schedule (IPS), and the SEMP and SE Schedule as bases, prepare an interface management schedule. The schedule may include all significant control and audit milestones defined by the corporate design review processes.

E.6.2.6 Step 6: Interface With Other Processes

The IM planning section of the SEMP shall be coordinated with the IPP and SE schedule and the design review planning sections.

E.6.2.7 Step 7: Update/Maintain the Planning Section

The IWG Chair shall review the IM planning section of the SEMP at the beginning of each of the AMS phases to determine if adjustments to the processes and schedules are required to ease or ensure effective fulfillment of the objectives of that phase.

E.6.3 Outputs of Interface Management Planning

The principal output is an IM planning section of the SEMP delineating the I/F identification, definition, documentation, approval, change, and control and audit process. In addition, the IM planning section establishes the IWG and its policy and procedures, constituents, and constituents' responsibilities.

E.6.4 Interface Management Planning Metrics

The IM planning section is to be reviewed to ensure completeness and cohesiveness. The interface management schedule and products are to be reviewed for consistency with the rest of the SEMP and SE schedule.

E.6.5 Interface Management Planning Tools

A word-processing tool is needed.

To facilitate preparation of the IM planning section of the SEMP, refer to all applicable sections of the System Engineering Manual. The outline (Table E-4) depicts the recommended contents of the IM planning section.

Table E-4. Interface Management Planning Section Outline of SEMP

Interface Management Planning Section Outline	
1	SCOPE
1.1	Overview
1.2	System Overview
2	APPLICABLE DOCUMENTS
3	INTERFACE WORKING GROUP
3.1	IWG Policy and Procedures
3.2	IWG Membership and Responsibilities
3.2.1	IWG Chair
3.2.2	Interface Custodian
3.2.3	Interface Participant
4	INTERFACE CONTROL PROCESS
4.1	Establishing Interfaces
4.1.1	Identifying Interfaces
4.1.1.1	Scope Sheet
4.1.1.2	Documenting Interface Control Documents (ICDs)
4.1.1.3	Coordinating Interfaces
4.1.1.4	Auditing, Statusing, and Controlling ICDs
4.1.1.4.1	Authorized ICD List
4.1.1.4.2	Review at System Requirements Review
4.1.1.4.3	Review at System Design Review
4.1.1.4.4	Review at Preliminary Design Review
4.1.1.4.5	Review at Critical Design Review
4.1.1.4.6	Review at Functional Configuration Audit/Physical Configuration Audit
5	REVISING INTERFACES

Interface Management Planning Section Outline	
5.1	Change Request Preparation
5.1.1	Review/Coordinate Change Request
5.1.2	Change Approval and Documentation
6	INTERFACE MANAGEMENT SCHEDULE
7	NOTES
Appendices	

E.7 Specialty Engineering Planning

E.7.1 System Safety Management Planning

System safety is the application of engineering and management principles, criteria, and techniques to optimize safety within constraints of operational effectiveness, time, and cost throughout all program lifecycle stages. The SSMP governs system safety efforts conducted in the AMS. The SSMP requires each program to develop, as part of the IPP, an ISSP tailored to the program's safety needs. The ISSP calls for contractors or vendors to develop and maintain a System Safety Program Plan (SSPP) that details the planned safety activities. The SSPP describes safety assessments, tasks, and activities of system safety management and system safety engineering required to support the design process and to identify, evaluate, and eliminate or control hazards throughout the system lifecycle.

Government System Safety engineers in the program are responsible for generating the ISSP, and, typically, the System Engineering Council (SEC) approves it as the first step in the system safety program. Contractor System Safety engineers in the program are responsible for generating the SSPP; the Program Manager approves the document internally, and the SEC approves it externally. System safety is an integral element of system engineering applicable to all design stages. Consequently, the stakeholder typically requires the SSPP as early as possible in the program lifecycle, usually within 60 to 90 days after contract award. Updates to the SSPP are necessary from stage to stage. Significant program changes may also warrant an update.

A comprehensive, approved SSPP provides value to the overall program. Misunderstandings are avoided regarding the safety definitions, scope of safety analysis, and risk-resolution procedures. The SSPP serves to increase safety awareness within the integrated team, building system safety into the product. The SSPP is tailored guidance for the System Safety Manager or engineer. Finally, the SSPP serves as an important audit trail, justifying the safety work performed and the methodology for safety decisions made. The program shall use the format and content guidelines for the SSPP documented in the SSMP. The SSMP is available on the Web (http://fast.faa.gov/).

E.7.1.1 Inputs to System Safety Management Planning

- Requirements for the System Safety effort detailed in the plan may come from stakeholders' requirements, which flows out of the Requirements Management Process (Section 4.3). Compliance shall be with the FAA NAS Modernization SSMP in the AMS FAA Acquisition System Toolset (FAST).

- Available system safety evaluation tools shall be used to determine, validate, and verify requirements in accordance with this manual and the SSMP.
- Inputs typically come from the engineer implementing the SE process. These include, potentially, all design groups and, depending on the program structure, either other specialty engineering groups or SE representatives on design teams. Among others, ensure coordination with Human Factors, Reliability, Maintainability, Quality, and Test and Evaluation.
- Lessons learned from previous programs, incidents, and accidents are to be included.
- The program shall form a program-specific System Safety Working Group (SSWG) that works with the FAA's NAS Modernization SSWG in managing risk.
- Programmatics are made available from the "Manage Program" process.

E.7.1.2 System Safety Management Planning Steps

E.7.1.2.1 Step 1: Collect Inputs

Coordinate with the program technical groups to obtain input information, including source data, tasks to be delineated in the plan, and other information.

E.7.1.2.2 Step 2: Analyze Inputs

Review and organize input data.

E.7.1.2.3 Step 3: Define Activities and Effort

Work with the technical experts to document as specifically as possible system safety assessment activities.

E.7.1.2.4 Step 4: Lay Out and Baseline Plan

Develop and coordinate the draft plan, incorporating revisions; obtain necessary approvals (lines of business, program management, senior technical experts, stakeholders), and release the baseline version of the plan.

E.7.1.2.5 Step 5: Interface With Other Processes

Coordinate and interface with other processes throughout plan deployment.

E.7.1.2.6 Step 6: Update/Maintain the Plan

Repeat this process to produce updates to the plan during the course of the program.

E.7.1.3 Outputs of System Safety Management Planning

Output is the System Safety Program Plan, which contains details on the intent, procedures, requirements, techniques, and criteria of the system safety program. The program shall use the format and content guidelines for the SSPP documented in the SSMP. The SSMP is available on the Web (http://fast.faa.gov/).

E.7.1.4 System Safety Management Planning Metrics

The metric for measuring the product of this process is completion of the plan in accordance with the SSMP. Additionally, the cost to produce and update the plan may be measured.

E.7.1.5 System Safety Management Planning Tools

Refer to the NAS Modernization SSMP (http://fast.faa.gov/).

E.7.2 Human Factors Engineering Planning — See AMS FAST.

E.7.3 Quality Engineering Planning — Reserved

E.7.4 Reliability, Maintainability and Availability Planning — The Reliability, Maintainability and Availability (RMA) planning section of the SEMP is to cover all aspects of RMA as detailed in System Engineering Manual (SEM) Section 4.7.2.

E.7.5 Electromagnetic Environmental Effects (E^3) Planning — The Electromagnetic Environmental Effects (E^3) planning section of the SEMP is to cover all aspects of RMA as detailed in SEM Section 4.7.2.

E.7.6 Hazardous Materials Management/Environmental Engineering Planning — The Hazardous Materials Management/Environmental Engineering planning section of the SEMP is to cover all aspects of RMA as detailed in SEM Section 4.7.2.

E.8 Integrity of Analyses Planning

E.8.1 Analysis Management Planning

The Analysis Management planning section of the SEMP is compiled following JRC 1 approval. It supports the objective of that process: "to create high likelihood that the program's analyses are credible, useful, and sufficient." Analysis Management planning defines the analyses to be performed throughout the program and the operational criteria for the analytic tools to be used, as well as the users and the requirements for verifying that the results are correct and sufficient. As a part of the SEMP, this section is reviewed with any other plans at the JRC 2b. The outline (Table E-5) depicts the recommended contents of the Integrity of Analysis planning section.

Table E-5. Table of Contents Integrity of Analysis Planning Section of SEMP

Functional Analysis Planning Section Example Outline		
1	SCOPE	
1.1	Overview	
1.2	Process Overview	This section contains a diagram showing the interrelationship between the various process elements, including tools, if any.
2	APPLICABLE DOCUMENTS	
3	TASKS	The tasks described are tied to the specific organizational and program requirements in accordance with Section 4.9.
4	PRODUCTS	This section describes the various …
5	RESPONSIBILITIES	This section details responsibilities of the various

Functional Analysis Planning Section Example Outline		
		organizational entities to accomplish the tasks of Section …
6	SCHEDULE	The schedule shown in this section is to be tied to the milestones of the IPP.
7	AUTOMATED REQUIREMENTS TOOL	This section describes the planned use of the requirements management tool, if any.
8	NOTES	
	APPENDICES	

E.8.1.1 Inputs to Analysis Management Planning

To prepare Analysis Management planning, the program team members with a need to perform or to have performed one or more analyses provide inputs. Often in this phase of planning a program, there is an iteration in which initial requests to have each analysis authorized and funded are seen as too extensive and costly for the program. Occasionally, program management determines that other analyses be performed or that analyses may replace tests or improve confidence; however, history shows that usually more analyses are initially requested than are approved. Negotiations then take place between proponents of the analyses and program management until a balanced set of analyses are defined. These negotiations may involve such compromises as reducing the scope of simulations and analyses—and possibly relaxing the precision, which the analyst may wish—to a level that management believes is adequate. Ultimately, each analysis earns its way into the integrated program plan by improving the management-balanced program metrics of cost, performance, and time/schedule. For a more in-depth treatment, see " Integrity of Analyses" (Section 4.9).

The kinds of input data that analysts provide include:

- Title or brief description of the analysis
- Description of programmatic benefit to be gained from the successful performance of the analysis; (i.e., the role the analysis plays in the program)
- Relative place in the project schedule:
  - What tasks may be precursors
  - Which tasks are successors and directly depend upon the analysis (i.e., the interfaces of the analysis to the program)
- The inputs required typically include:
  - System requirements
  - Available technology unique to the analysis (both as used in the system being analyzed and as used to perform or support a part of the analysis)
  - Data sets, as possibly updated by precursor task(s)—a program generally maintains a configuration-controlled set of data (environmental factors (atmospheric models, extent of corrosion conditions, etc., some of which may mature or change through the course of a program)); trade study parameters (range penalty per pound of

weight added, at current design state, etc.); and material properties, etc., to be used in analyses

- The inputs from the planning of successor tasks, which essentially define:
  - The reasons for the analysis to be done
  - System/subsystem/component description, as it is involved in analysis
  - The precision, scope, timing, and quality of results that they may get from the analysis; the nature of the deliverable product of the analysis to each using successor task is to be defined

- Analytical tool(s) selected and basis/justification of selection (is it from an approved list of tools available or did the analyst create it?)
- Process and plan for ensuring competence of the analyst (credentials, training, certification, testing, etc.)
- Process for ensuring the integrity of the results (analyst's say-so, cross-check by independent analysis, detailed review by expert, or test validation within specified accuracy, etc.)
- Subtasks to be performed to begin, perform, and validate the analysis
- Estimate of duration and resources required; resources may include labor hours, charged computer runtime, lab support charges, and similar programmatic cost and schedule burdens

E.8.1.2 Analysis Management Planning Steps

E.8.1.2.1 Step 1: Collect Inputs

Coordinate with program technical groups on analysis needed.

E.8.1.2.2 Step 2: Analyze Inputs

Review and organize the data; check for conflicts in precursor/successor relationships among different analyses; and prepare management summaries of resource needs (cost, equipment, facilities, and talent).

E.8.1.2.3 Step 3: Coordinate With Interfacing Program Functions

Determine details of configuration control of tool and skill inventories, data sets, scheduling, and so that specific and correct references may be made in the Analysis Management planning section.

E.8.1.2.4 Step 4: Lay Out and Baseline the Planning Section

Coordinate the draft planning section; support management/analyst/user negotiations; incorporate revisions; obtain necessary approvals; and release the baseline version of the planning section in the SEMP.

E.8.1.3 Outputs of Analysis Management Planning

The output of this process *is* the Analysis Management planning section of the SEMP, which typically consists of these elements:

- **Introduction**. This section covers scope and purpose. It is recommended that this section include any analysis that involves separate task management and control, or which has stakeholders from the analyst's sub organization, or which is deemed to have a significant influence on the program product. On the other hand, minor analyses that merely fill in details of work within a single sub organization and are small in scope are not intended to be formally controlled by this planning section (although the precepts of the process "Integrity of Analyses" always apply as a best practice).
- **Specific comments on the role of Configuration Management (CM) as it applies to Analysis Management.** It is recommended that approved analytic tools (including special or proprietary procedures, computer programs, networks, and workstations; and physical, computational, and hybrid models) be under CM, as well as rosters of analysts with expertise annotated. It is recommended that data sets especially be under CM, and the AMP requires use of configured data in managed analyses. (Several analyses using conflicting data leads to faulty conclusions that confuses a program.) Within the planning section, it is also recommended that some special notation (like **{CM}**) be appended to any reference of name, tool, or data that is configuration controlled.
  - Abstract of the programmatic approach(es) to ensure the competence of the analysts. This may range from merely listing credentials within each analysis to a rigorous testing and validation program of analysts doing certain work. With the various options chosen by the program, the reference in any one of the analysis coverages is simplified.
- **Tailoring.** This section provides tailoring of specific documentation requirements, where applicable. Coordination with the procuring authorities is recommended so that agreement is reached on what tailoring needs to be done to minimize any delay in getting the planning approved.
- **Organization.** This subsection discusses the organizational aspects of analysis management and typically, is a product of SE. The analyses may be performed in any sub organization or by contractors; if so, a separate contracting plan is to supplement the Analysis Management planning section. When there is more than one stakeholder for an analysis, the analysis coverage shall deal with possibly conflicting needs. Thus, a hierarchical ranking of precision, scope, timing, and quality of the analysis product is to be established, and a single set of requirements levied on the analysis. Analysis Management planning development, deployment, and maintenance are the responsibility of SE within the program. The data to be presented (see the "Inputs to Software/Development Planning" (Paragraph 4.2.4.4.3.1)) for each analysis is the responsibility of an analyst assigned to that analysis. This responsibility covers acquisition, interpretation, analysis, and transmittal of the data to the Analysis Management planning section author.
- **Specific Analyses.** This subsection covers each of the various analyses that qualify for inclusion in the Analysis Management planning. The format follows and addresses the items identified in Paragraph 4.2.4.4.3.1. The final subsection for each analysis is to be the connectivity (precursor and successor tasks) of the analysis, and the duration and level of effort required.

E.8.1.4 Analysis Management Planning Metrics

The metrics for the process of preparing and maintaining the Analysis Management planning section of the SEMP are the completion of the planning, the readiness of the planning section to support management/analyst/stakeholder negotiations, and the costs of the first draft, release, and maintenance of the planning section.

E.8.1.5 Analysis Management Planning Tools

Analysis Management planning is typically prepared using a program-standard word-processing tool. Interfacing tools may be noted, to include the business-control and scheduling tools, and the CM tools, as well as any program-unique tools identified.

E.9 Risk Management Planning

Risk is inherent in every program. Stakeholders know this and expect contractors to address risks in program plans. SE addresses three facets of risk: technical, schedule, and cost. Technical risks include all events that may prevent the program from satisfying contractual requirements, including performance, supportability, maintainability, and regulatory requirements. Schedule risks are events that may prevent timely execution of tasks identified in the IPP. Cost risks are events that may cause actual expenditures to exceed estimated costs.

Risk Management is a key process within SE. The program and functional managers implement it by ensuring appropriate resources are applied to reduce risk to acceptable levels. Risk Management consists of five essential components: identify risks, analyze risks, identify mitigation options, implement risk-reduction plan, and monitor risks.

The risk management planning section describes the approach, methods, procedures, and criteria for risk management and its integration into the program decision process. It is continually updated throughout the program life with the SEMP.

E.9.1 Inputs to Risk Management Planning

Inputs include program goals, constraints, IPP/IPS, Rough Order Magnitude/Basis of Estimate.

The risk management process is tailored according to the complexity and criticality of each specific project. The program manager weighs mission goals with the potential benefits and costs and in determining the acceptable level of risk for a program. Stakeholders and regulatory directives may also affect determination of acceptable risk levels.

E.9.2 Risk Management Planning Steps

Risk Management planning guides the program and functional managers in ensuring that adequate risk management is applied at the key decision points of a program.

E.9.2.1 Step 1: Establish Risk Review Team

The team should include at least the project task leaders. It is recommended that all affected specialty support groups be identified and consulted throughout the risk management process. In addition, it is recommended that independent non-advocate experts and stakeholders, if appropriate, be identified for participation during formal risk reviews.

E.9.2.2 Step 2: Define Risk Management Process

It is recommended that the Risk Management process, or a specially tailored version that is followed by the program, be documented, as well as justification for modification of the process provided. It is further recommended that the process contain the key steps of identifying risk, assessing risk, and mitigating risk, as well as the procedure for implementing contingency plans and risk monitoring. It is also recommended that appropriate tools to implement each step be identified if available.

E.9.2.3 Step 3: Define Risk Assessment Criteria

The risk categories (technical, schedule, and cost) and risk levels defined in the Risk Management process may not be appropriate for every program. Technical risks may be subdivided into such categories as Performance, Supportability, and Software, to emphasize key requirements based on program goals. Acceptable schedule or cost risks may also require adjustment based on program goals or constraints. It is recommended that programmatic risks be added if appropriate; justifications for process modification documented; and criteria for closing a risk item defined.

E.9.2.4 Step 4: Identify Key Decision Points

Risks reside in any technology development program. Risk Management is an essential tool used by program managers to assess the adequacy of the integrated program plan in achieving program goals. At each program review, the decision to proceed with a program shall be based on recognition of identifiable risks and adequacy of contingency plans. It is recommended that risks be identified and assessed and mitigation options identified before each review.

E.9.2.5 Step 5: Define Risk Documentation Procedure

It is recommended that all risks identified, assessed, and mitigated be included in a program's documentation. The risk management planning section includes a risk identification worksheet and instruction for submitting risks. It also provides means of documenting steps taken in the risk management process for each risk until closure of the risk.

E.9.2.6 Step 6: Define Monitoring Procedure

When a risk is identified, immediate action may be taken to reduce or eliminate the risk. This would result in a change to the SEMP and possible closure of the risk. Alternatively, action may be deferred until a specific predetermined trigger event occurs. It is recommended that the procedure and forms for identifying the trigger events and resulting contingency action be documented. It is also recommended that the forum for reviewing risks and status of trigger events be identified.

E.9.2.7 Step 7: Update this Section as Needed or With Any Updates of the Integrated Program Plan

It is recommended that the program progress be periodically reviewed against the Risk Management Planning section.

E.9.3 Risk Management Planning Outputs

The following is the general outline (Table E-6) to be used for the Risk Management Planning section (or as a separate plan if considered necessary).

712 **Table E-6. Table of Contents Risk Management Planning Section of the SEMP**

Risk Management Planning Section Outline	
1	SCOPE
1.1	Overview
1.2	System Overview
2	RISK REVIEW TEAM
3	RISK MANAGEMENT PROCESS
3.1	Process
3.2	Risk Assessment Criteria and Mitigation Requirements
3.3	Key Decision Points
3.4	Documentation Requirements
4	RISK MONITORING PROCEDURE
5	RISK MANAGEMENT SCHEDULE
6	NOTES AND REFERENCES
7	APPENDICES
7.1	Documentation Forms
7.2	Risk Management Tools

713

714 **E.9.4 Risk Management Planning Metrics**

715 Completion (or revision as needed) of the Risk Management planning section before each AMS
716 phase exit review and approval of this section at the review are the primary metrics of success.

717 **E.9.5 Risk Management Planning Tools**

718 Risk Management Planning is typically prepared using a word-processing tool. Refer to the
719 appropriate sections of this manual to ensure that the activities described in the Risk
720 Management Planning section are consistent with the SE planning process. This comparison
721 ensures that risk management is injected into the progressive and iterative SE process steps for
722 this program.

723 **E.10 Configuration Management Planning**

724 Configuration Management planning documents the formal management system of CM to
725 ensure that the integrity and continuity of the design, engineering, and cost tradeoff decisions
726 made between technical performance, producibility, operability, testability, and supportability are
727 recorded, communicated, and controlled by program and functional managers. CM planning
728 provides the means for the:

729 • Configuration Identification process that identifies the functional and physical
730 characteristics of selected system components, designated as configuration items (CI),
731 during the system's acquisition lifecycle

- Configuration Control process that controls the changes to CIs during the system's acquisition lifecycle
- Configuration Status Accounting process that records/reports change processing and implementation status
- Configuration Audits process that supplies current descriptions of developing hardware configuration items, computer software configuration items, and the system itself

The Configuration Management Organization typically owns this planning section. The planning section may be initiated by inputs from the SE process as early as the Investment Analysis, phase one, but formally starts at Investment Analysis, phase two, and continues throughout the program lifecycle as the system develops and is modified.

E.10.1 Inputs to Configuration Management Planning

Following are the two categories of CM planning:

- **Concepts (initial, baseline).** This data identifies the functional and physical characteristics of selected system components and CIs to be controlled and managed.
- **Integrated Program Plan Requirements.** This data identifies contractual and non-contractual constraints, such as program deliverables, cost, and schedule.

E.10.2 Configuration Management Planning Steps

E.10.2.1 Step 1: Collect Input Data

The beginning task is to collect all input data.

E.10.2.2 Step 2: Define Configuration Items

The planner determines what is to be controlled and managed by identifying the CIs from the initial and/or baseline concept.

E.10.2.3 Step 3: Identify Means for Configuration Change Management

The planner needs to determine how to control and manage each of the identified CIs.

E.10.2.4 Step 4: Identify Means for Configuration Status Accounting

This step determines when and how to document the change processing and implementation status and encompasses establishing the frequency and format of the record and report documents.

E.10.2.5 Step 5: Identify Means for Configuration Verification and Audit

Identify methods to supply current descriptions of the CIs and means to trace all changes back to the baseline configuration.

E.10.3. Outputs of Configuration Management Planning

The output shall be the Configuration Management Planning section that outlines all the tasks with corresponding completion dates and personnel responsible for task completion.

E.10.4 Configuration Management Planning Metrics

The metric for measuring the product of the CM Planning process is completion of the planning section within cost and schedule.

E.10.5 Configuration Management Planning Tools

The CM Planning section is typically prepared using word-processing and drawing tools.

E.11 Validation and Verification Planning

The Master Verification Plan (MVP) contains both validation and verification planning. Validation is the process of proving that the right system is being built (i.e., that the system requirements are unambiguous, correct, complete, consistent, traceable to needs, operationally and technically feasible, and verifiable). The validation planning process is conducted to demonstrate that the requirements for a system are clearly understood and that it is possible to satisfy them through design work using available state-of-the-art technology, funding, and schedule. Verification is the process (tasks, actions and activities) of confirming that evolving system solutions comply with functional, performance, and design requirements that spell out stakeholder (internal and external) expectations of capabilities, as well as performance and characteristics of the developed system. Product verification may occur during any phase of a product development cycle, but is more likely to occur after the product Preliminary Design Review (PDR). Verification is the process that ensures that system requirements have been met by the design solution and that the system is ready for use in its operational environment. This means that a verified system may demonstrate that it complies with mission need and meets functional, performance, allocated, derived, and interface requirements, as well as design and allocated constraints that achieve customer needs.

The MVP objective is to define all verification activities that demonstrate the system's capability to meet the specification requirements.

E.11.1 Inputs to Master Verification Plan

The inputs required for preparing the master verification plan are:

- Existing requirements and specifications documents
- Risk-mitigation plan
- Existing Functional analyses, including CONOPS
- MNS, fRD, and program Statement of Work
- NAS-Level SEMP
- Program-specific schedule constraints and milestones provided by the SEMP and SEM
- IPP, including the test and evaluation (T&E) plans and schedules, safety, and quality sections; and the IPS
- Existing product performance/objectives and physical specifications supplied through system/design engineering, including the results of trade studies, baseline product modeling, CM planning and changes, system specifications, system/segment design document, interface control planning and documents (Interface Control, Interface Requirements Documents/ICDs) and technical performance measures

- External standards and conditions required by government regulatory agencies

E.11.1.1 Master Verification Plan Steps

The MVP for the component through the system-level is normally written by SE in conjunction with T&E and includes coordinating with program multidisciplinary project teams. The following major steps are required for developing of the master verification plan(s).

E.11.1.1.1 Step 1: Collect and Review Inputs

The inputs provided by each responsible organization are required to be collected and reviewed for acceptability and completeness by the MVP coordinator.

E.11.1.1.2 Step 2: Develop Master Verification Plan

Using the inputs collected and reviewed in Step 1, the MVP coordinator prepares the master verification plan(s) using the format described in Figure 4.12-12.

E.11.1.1.3 Step 3: Review Plan(s)

The master verification plan(s) are reviewed both before and during program critical milestones (normally starting at the PDR or equivalent). The master verification plan(s) are baselined upon initial program approval.

E.11.1.1.4 Step 4: Maintain Plan(s)

The MVP plan coordinator maintain continuous cognizance of program progress throughout the life of the program. Changes to the program are reflected in the master verification plan(s).

E.11.1.1.5 Step 5: Distribute Plan(s)

The MVP plan coordinator provides the master verification plan(s) to all stakeholders, who manage by the master verification plan(s). These stakeholders include the program manager, stakeholders, project teams and leads, system engineering, test and evaluation, quality assurance, and safety, as a minimum.

E.11.1.2 Outputs of Master Verification Plan

The output of the MVP planning is the MVP and includes planning that supports development of the following products.

E.11.1.2.1 Master Verification Plan

The MVP describes the overall verification program. It provides the content and depth of detail necessary for full visibility of all verification activities. Each major verification activity is defined and described in detail. The plan provides a general schedule and sequence of events for major verification activities. It also describes test software (including code and documentation), Ground Support Equipment, and facilities necessary to support verification activities. The systems engineer and verification engineer develop the plan with design and test organizations, with all having a thorough understanding of the verification program concept, program requirements at all levels, and the methods identified in the Verification Requirements Traceability Matrix (VRTM) for verification.

E.11.1.2.2 Verification Requirements Traceability Matrix

The VRTM is that portion of a requirements document that defines how each requirement is to be verified, the plan that describes the verification activity, and the results (including traceability to the test of verification report). The VRTM is based on the Validation Table documented in the Validation Report. The design, test, SE, and verification team members jointly develop the VRTM. The VRTM establishes the basis for the verification program.

E.11.1.2.3 Requirements Verification Compliance Document

The Requirements Verification Compliance Document (RVCD) provides the evidence of compliance for each requirement at all levels and to each VRTM requirement. The flow down from the requirements documents to the VRTM completes the full requirements traceability. Compliance with all requirements ensures that the system- level requirements have been met.

The RVCD defines for each requirement the methods of verification and corresponding compliance information. The results of the verification activity, including evidence of completion, are recorded and documented in the RVCD. It is recommended that the RVCD contain information regarding the results of each verification activity and a description and disposition of conformance, nonconformance, conclusions, and recommendations. The compliance information provides either the actual data, or a reference to the location of the actual data, that shows compliance with the requirement. The document also includes a section that details any noncompliances; it is recommended that this section also specify appropriate reverification procedures. The RVCD is an input into the Requirements Management process (Section 4.3). Decisions regarding what to do with noncompliant requirements are made in Requirements Management.

E.11.1.3 Master Verification Plan Metrics

Three fundamental metrics exist to help measure and improve the verification plan:

- Timeliness of developing and reviewing the verification plan
- Quality of developing the verification plan
- Cycle Time to complete development and distribution of the verification plan regarding collecting and reviewing the inputs for verification plan development

E.11.1.4 Master Verification Plan Tools

The MVP shall be completed in accordance with the guidelines documented and tools described in this section and Validation and Verification (Section 4.12).

E.12 Integrated Planning Lifecycle — Reserved

E.12.1 Real Property Management Planning — Reserved

E.12.2 Deployment and Transition Planning — Reserved

E.12.3 Integrated Logistics Support Planning —Reserved

E.12.3.1 Maintenance Planning — Reserved

E.12.3.2 Maintenance Support Facility — Reserved

E.12.3.3 Direct-Work Maintenance Staffing — Reserved

E.12.3.4 Supply Support — Reserved

E.12.3.5 Support Equipment — Reserved

E.12.3.6 Training, Training Support, and Personnel Skills — Reserved

E.12.3.7 Technical Data — Reserved

E.12.3.8 Packaging, Handling, Storage, and Transportation (P, H, S & T) — Reserved

E.12.3.9 Computer Resources Support — Reserved

E.12.4 Sustainment/Technology Evolution — Reserved

E.12.5 Disposal — Reserved

E.13 Maintain System Engineering — Reserved